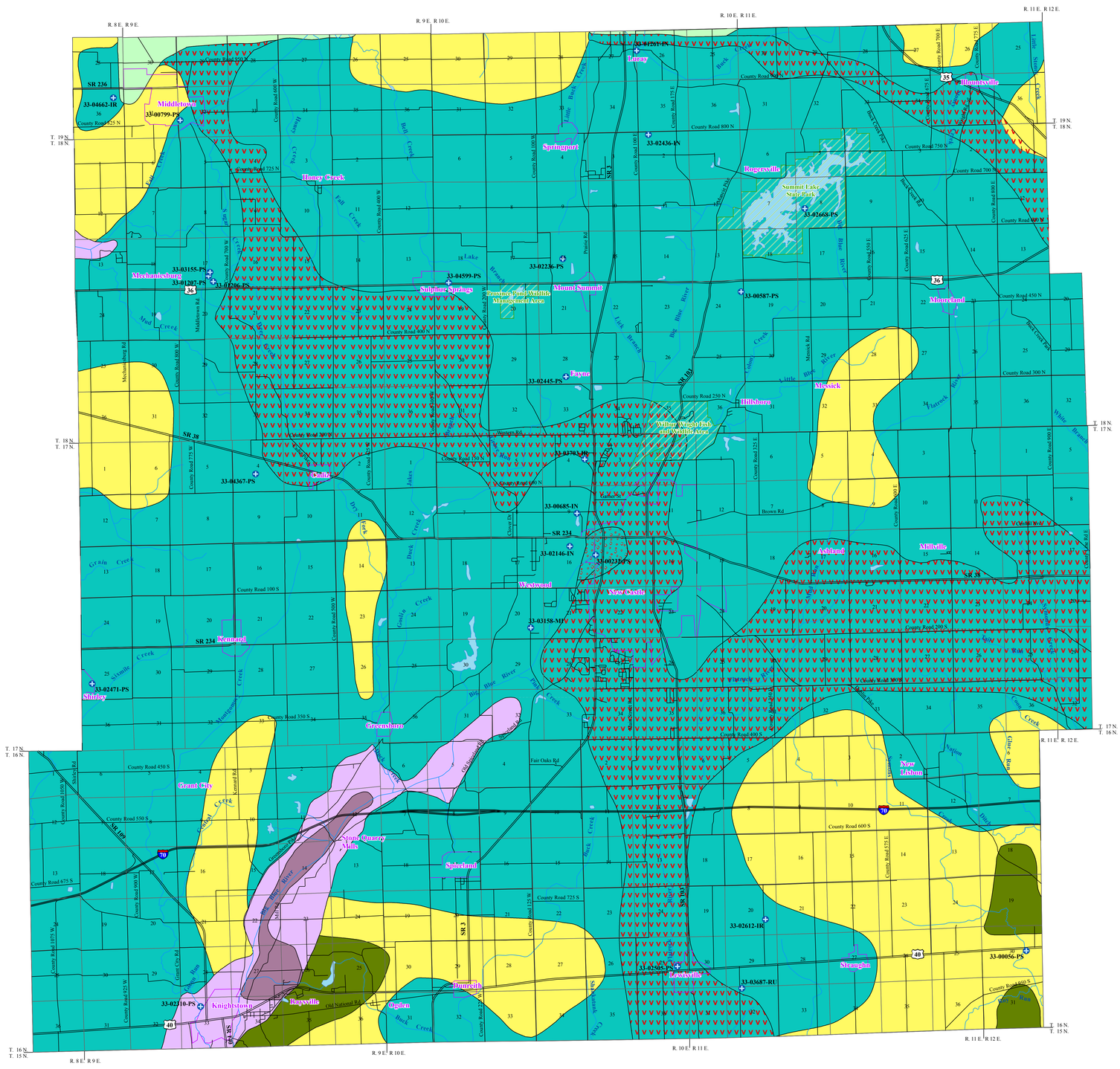
UNCONSOLIDATED AQUIFER SYSTEMS OF HENRY COUNTY, INDIANA



Six unconsolidated aquifer systems have been mapped in Henry County: the Till Veneer; the New Castle Till; the New Castle Till Subsystem; the New Castle Complex; the Buried Valley; and the White River and Tributaries Outwash Subsystem. The systems are comprised of sediments deposited by or resulting from glaciers, glacial meltwaters, and post-glacial precipitation events. Boundaries of these aquifer systems are commonly gradational and individual aquifers may extend across aquifer system boundaries.

The thickness of unconsolidated sediments in Henry County is quite variable. In portions of the southwestern part of the county, unconsolidated materials are less than 75 feet thick and bedrock is near the surface in places along the Big Blue River near Stone Quarry Mills. Elsewhere in Henry County, unconsolidated deposits are commonly greater than 200 feet thick. They are more than 500 feet thick in parts of the buried bedrock valley northwest of New Castle.

Regional estimates of aquifer susceptibility to contamination from the surface can differ considerably from local reality. Variations within geologic environments can cause variation in susceptibility to surface contamination. In addition, man-made structures such as poorly constructed water wells, unplugged or improperly abandoned wells, and open excavations can provide contaminant pathways that bypass the naturally protective clays.

Till Veneer Aquifer System

The Till Veneer Aquifer System is located along the Big Blue River in southwestern Henry County where the unconsolidated material is predominantly thin till with a few thin seams of outwash/alluvium overlying bedrock. In these areas this thin till is chiefly the product of the deposition of Wisconsin glacial till over an uneven, eroded bedrock surface. This system has the most limited ground-water resources of the unconsolidated aquifer systems in the county.

There is little potential for ground water production in the Till Veneer Aquifer System in Henry County. Only a few of the reported wells penetrating this aquifer system are completed in unconsolidated materials rather than the underlying bedrock. The total thickness of this system typically ranges from about 15 to 40 feet and the few wells completed in this system range from 31 to 40 feet deep. Where present, sand and gravel units are generally less than 3 feet thick. Because of the generally low permeability of the near-surface materials, this system is moderately susceptible to contamination from surface sources.

New Castle Till Aquifer System

The New Castle Till Aquifer System in Henry County has thin intratill sand and gravel layers. Unconsolidated deposits range in thickness from about 100 feet to more than 250 feet (near areas where glacial deposits have filled bedrock valleys). Potential aquifer materials include outwash sands and/or gravels that commonly range from 5 to 10 feet thick and are generally overlain by 40 to 100 feet of till.

A small part of the New Castle Till Aquifer System overlies a deep buried bedrock valley in northeastern Henry County. However, there is little evidence for ground water potential in this bedrock valley in the county. This aquifer system reaches a thickness of about 300 feet in this portion of the bedrock valley.

This aquifer system is capable of meeting the needs of domestic and some high-capacity users. Wells are generally 50 to 185 feet deep. Domestic well capacities are typically 10 to 45 gallons per minute (gpm) and static water levels are commonly 15 to 35 feet below surface. Only 1 registered significant ground-water withdrawal facility uses this aquifer system in Henry County. The 2 wells in this facility utilize the basal sand and gravel and have reported yields of 250 and 350 gpm.

The New Castle Till Aquifer System has a low susceptibility to surface contamination because intratill sand and gravel units are generally separated from the surface by till layers within the system.

New Castle Till Aquifer Subsystem

Areas where unconsolidated materials are generally greater than 50 feet in thickness, yet have little aquifer potential, are mapped as the New Castle Till Aquifer Subsystem in Henry County. This system is typically less than 150 feet thick and is mapped in a few isolated areas near the southern county line. Wells completed in this system in Henry County range from 31 feet to 105 feet deep. Potential aquifer materials include thin, intratill sand and gravel deposits that are typically less than 5 feet thick. Where present, aquifer materials are capped by till that is generally 30 to 80 feet thick.

This aquifer system is capable of meeting the needs of some domestic users. However, in Henry County most of the wells constructed in the area mapped as New Castle Till Aquifer Subsystem bypass the unconsolidated materials and utilize the underlying bedrock aquifer. The New Castle Till Aquifer Subsystem is generally not very susceptible to surface contamination because its intratill sand and gravel units are overlain by thick till deposits.

New Castle Complex Aquifer System

The New Castle Complex Aquifer System is mapped over a large portion of Henry County. This aquifer system is characterized by deposits that are quite variable in materials and thickness. Sand and gravel aquifer deposits are commonly overlain by a thick till. This system generally also exhibits alternating layers of outwash and till of variable thickness above the main aquifer. The main aquifer deposits that cap the buried bedrock valley are typically thicker and more continuous than the shallower sand and gravels in this system. In Henry County this system is generally 100 to 250 feet thick.

However, in places this system overlies deep buried bedrock valleys. The total thickness exceeds 400 feet in many places and the deposits reach a maximum thickness of more than 500 feet northwest of New Castle. The deeper portions of the bedrock valleys were filled with lacustrine deposits and there is little evidence for ground water potential in most of these buried bedrock valleys in Henry County. Few domestic wells in this area utilize the deeper unconsolidated aquifers, because shallower aquifers are available.

In Henry County only one isolated area has reported deep sand and gravel deposits in the buried bedrock valleys. Water well records associated with the City of New Castle indicate that the deep sand and gravels range from 5 to 11 feet thick and may produce more than 100 gpm. However, few wells in this area utilize the deeper unconsolidated aquifers, because the shallower aquifers have greater potential.

This system is capable of meeting the needs of domestic and some high-capacity users in Henry County. Outwash aquifer materials in the New Castle Complex Aquifer System are generally 10 to 25 feet thick and are overlain by a till cap which is commonly 50 to 110 feet thick. Wells in this system are typically completed at depths of 60 to 130 feet. Domestic well yields are commonly 10 to 60 gpm and static water levels are generally 15 to 50 feet below the surface. There are 22 registered significant ground-water withdrawal facilities (48 wells) utilizing this system and individual wells produce 25 to 1000 gpm. The New Castle Complex Aquifer System is not very susceptible to contamination because thick clay materials overlie the aquifer materials.

Buried Valley Aquifer System

The Buried Valley Aquifer System consists of alternating till layers and intratill sand and gravel units of varying thickness deposited in bedrock valleys. During valley development, bedrock was eroded to create valleys that were subsequently filled with unconsolidated sediment. This system is mapped in two small areas along the northern county line, where a bedrock valley cuts through the Silurian and Devonian bedrock and into the underlying Maquoketa Group in most places. The buried bedrock valleys are generally filled by more than 250 feet of unconsolidated material and in some places more than 400 feet. In this part of the county the deeper portions of the bedrock valleys are typically filled with glacial outwash deposits and fine grained lacustrine deposits.

The Buried Valley Aquifer System has the potential to meet the needs of domestic and some high-capacity users. Domestic wells commonly utilize the shallower discontinuous intratill sand and gravel units. The few reported wells range from 29 to 287 feet deep with static water levels between 12 and 50 feet below the surface. Well yields are between 5 and 100 gpm. The higher yielding wells are typically completed in the deeper sand and gravel deposits.

Because thick till deposits overlie the aquifer units and inhibit the downward migration of contaminants the Buried Valley Aquifer System is generally not very susceptible to surface contamination.

White River and Tributaries Outwash Aquifer Subsystem

The White River and Tributaries Outwash Aquifer Subsystem is mapped along portions of the Big Blue River in the southwestern part of Henry County and also in a small area just southwest of Middletown in the floodplain of Fall Creek.

Total thickness of unconsolidated deposits overlying bedrock ranges from about 25 to 90 feet, with up to 30 feet of continuous sand and gravel. Few wells utilizing this system in Henry County have been reported. The White River and Tributaries Aquifer Subsystem has the potential to meet domestic needs. Domestic well yields range from 10 to 60 gpm with static water levels ranging from flowing to 40 feet below surface. Many of the wells penetrating this system in Henry County are finished in the underlying bedrock. There is 1 registered significant ground-water withdrawal facility (1 well) with a reported capacity of 510 gpm. Additionally, there is 1 irrigation well north of Knightstown with a reported capacity of 600 gpm.

Areas within this aquifer system that have overlying clay or silt deposits are moderately susceptible to surface contamination; whereas, areas that lack overlying clay or silt deposits are highly susceptible to contamination.

Map generated by Andrew G. Dunkman, Joseph L. Phillips, and Jennifer K. McMillan
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This map was created from several existing shapefiles. Township and Range Lines of Indiana (line shapefile, 20020621), Land Survey Lines of Indiana (polygon shapefile, 20020621), and County Boundaries of Indiana (polygon shapefile, 20020621), were all from the Indiana Geological Survey and based on a 1:24,000 scale. Draft road shapefiles, System1 and System2 (line shapefiles, 2003), were from the Indiana Department of Transportation and based on a 1:24,000 scale. Populated Areas in Indiana 2000 (polygon shapefile, 20021000) was from the U.S. Census Bureau and based on a 1:100,000 scale. Streams27 (line shapefile, 20000420) was from the Center for Advanced Applications in GIS at Purdue University. Unconsolidated aquifer systems coverage (Grove, 2006) was based on a 1:24,000 scale.

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